school. The rearrangement of the laboratory work is particularly commendable. The logical arrangement, clear treatment, and freshness of the larger book are retained in this volume. There is still left a heavy year's work for a good teacher and a strong class, and it is the judgment of the reviewer that further simplification might have been secured by the less minute treatment of some subjects, as the root, movement of plants, growth, and ecology, admirable as those subjects are in their present form. The many good points of the book will commend it to secondary teachers, whose class room experience alone can determine its fitness to survive.—I. N. MITCHELL, *State Normal School, Milwaukee, Wis.*

The white pine.[3]

THE white pine has always commanded more than its share of study because of its economic importance. In so far as Professor Spalding and Dr. Fernow have succeeded in explaining the geographic and edaphic factors which control its distribution, they have made a valuable contribution to ecology and plant geography. The large number of acre-yield tables of measurements and explanations of soil and forest conditions enable them to draw certain definite and scientific conclusions regarding the causes of distribution.

The leading ecological factor is the nature of the soil and the water content of the same. While adapting itself to almost any variety of soil, the white pine prefers one with a fair admixture of sand, insuring a moderately rapid drainage. This is a soil intermediate between the stiff clayey soil on one hand, where the deciduous forest predominates, and the dry, light sandy, coarse and gravelly soil on the other hand, where the red pine (*Pinus resinosa*) and the jack pine (*Pinus Banksiana*) seem able to outdo it. The shallow root system of the white pine permits it to occupy the thinner soils of the rocky slopes in the Adirondacks and New England states.

Light is another important ecological factor. Compared with other pines the white pine has great shade endurance, hence its admixture with maples and beech, where it has an equal chance in open places. But white pine seedlings are never found in the dense shade of the hardwood forest; in such a place there is little hope for the white pine to gain a foothold. Owing to this inability of the white pine seedling to maintain itself in the dense shade, the hardwood forest is gradually encroaching upon it, except in soils too poor for the development of the deciduous forest.

A carefully prepared map of the geographic distribution offers a foundation for the discussion of the climatic factors governing such distribution.

[3] SPALDING, V. M.: The white pine. Revised and enlarged by B. E. FERNOW. Contributions on insect enemies of the white pine by F. H. CHITTENDEN, and on the wood of the white pine by FILIBERT ROTH. Bulletin no. 22. U. S. Department of Agriculture, Division of Forestry. 4to. pp. 185. *pl.* —. 1899.

It is pointed out that the white pine is delimited by conditions of humid and cold atmospheres such as are found in northern latitudes and high altitudes. Its distribution is perhaps more dependent on humidity than on temperature, or rather on a low transpiration factor, that is, such a relation of heat and moisture, both at the foot and at the top, that the thin foliage can readily perform its function.

Besides the distribution of the white pine, the monograph treats of the white pine lumber industry, the original stand and present supplies, the morphological characters, the seed and seed supply, the structure and development of the wood, the growth and development in open stand and in the forest, growth in volume, the yield of white pine, and dangers and diseases. Contributions by two specialists on insect enemies and wood of the white pine add to the economic interest. The appendix, which comprises more than half the monograph, consists of seven sets of tables of measurements, and a careful explanation of the forms used in the investigations.—H. N. WHITFORD.

MINOR NOTICES.

AMONG THOSE who have taken advantage of the offer of the Division of Forestry to make a personal study of areas which offer favorable opportunities to illustrate forest management are the owners of two large tracts of land in the Adirondacks. The results of the investigation are embodied in a recent bulletin[4] of the Department. The author makes a plea for an American system of forestry. He discusses six measures of prime importance for the proper care of the European forest, though they would be exceedingly impracticable if applied to the plots under consideration, and then proceeds to propose a simple system of management that will enable the owner to make a profit from the land and at the same time secure the permanence of the forest.

Among the features of great interest to the ecologist is the special consideration of the spruce. Under this head the habits of the spruce, the influence of situation and soil on its character and distribution, its tolerance of shade, and its reproduction are discussed in a clear and scientific manner. Another valuable feature is the presence of a large number of illustrations, mainly from photographs, and of two contour maps of the regions described. —H. N. WHITFORD.

DR. C. F. MILLSPAUGH has issued as Vol. II, no. 1, of the Botanical Series of the Field Columbian Museum the first part of his *Plantae Utowanae*, being a catalogue of the species. The plants were collected between December 1898 and March 1899 in Bermuda, Puerto Rico, St. Thomas, Culebras, Santo Domingo, Jamaica, Cuba, The Caymans, Cozumel, Yucatan, and the

[4] GRAVES, HENRY S.: Practical forestry in the Adirondacks. Bulletin no. 26, U. S. Department of Agriculture, Division of Forestry.